wwPDB X-ray Structure Validation Summary Report (i)

Jan 30, 2024 – 09:24 PM EST

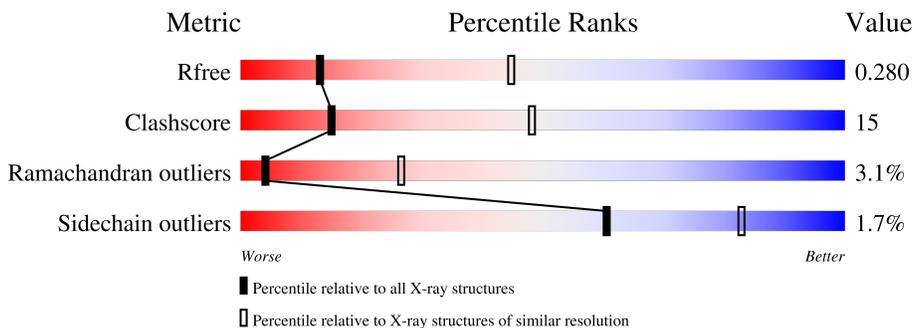|		
PDB ID	:	1JY7
Title	:	THE STRUCTURE OF HUMAN METHEMOGLOBIN. THE VARIATION OF A THEME
Authors	:	Biswal, B.K.; Vijayan, M.
Deposited on	:	2001-09-11
Resolution	:	3.20 Å(reported)

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.

Metric	Percentile Ranks	Value
Rfree		0.280
Clashscore		15
Ramachandran outliers		3.1%
Sidechain outliers		1.7%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	141	66% · 33% ·
1	C	141	65% · 34% ·
1	P	141	65% · 34% ·
1	R	141	65% · 33% ·
1	U	141	66% · 32% ·
1	W	141	61% · 38% ·
2	B	146	66% · 32% ·

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Mol	Chain	Length	Quality of chain
2	D	146	64% 34%
2	Q	146	63% 36%
2	S	146	66% 32%
2	V	146	68% 30%
2	X	146	66% 32%

2   Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 13668 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Hemoglobin alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0
1	C	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0
1	P	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0
1	R	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0
1	U	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0
1	W	141	Total 1069	C 685	N 187	O 194	S 3	0	0	0

- Molecule 2 is a protein called Hemoglobin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0
2	D	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0
2	Q	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0
2	S	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0
2	V	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0
2	X	146	Total 1123	C 724	N 195	O 201	S 3	0	0	0

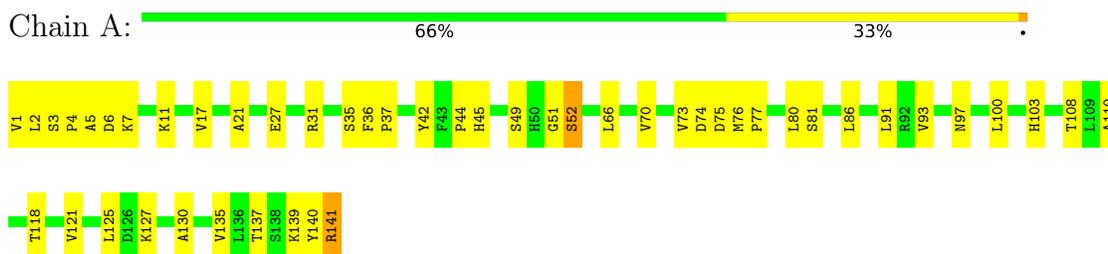- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).

HEM
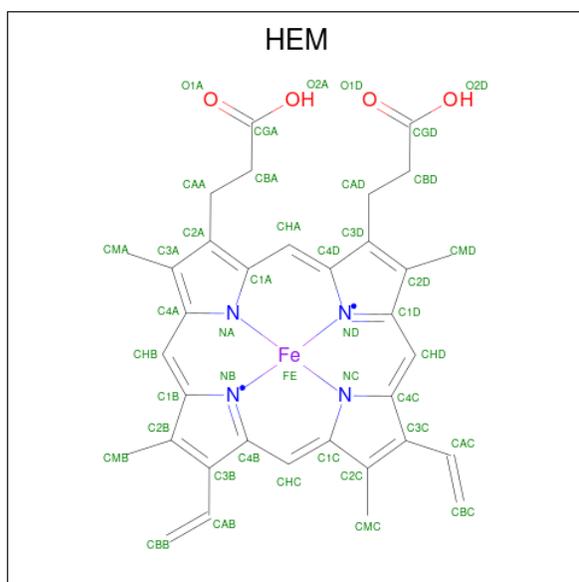
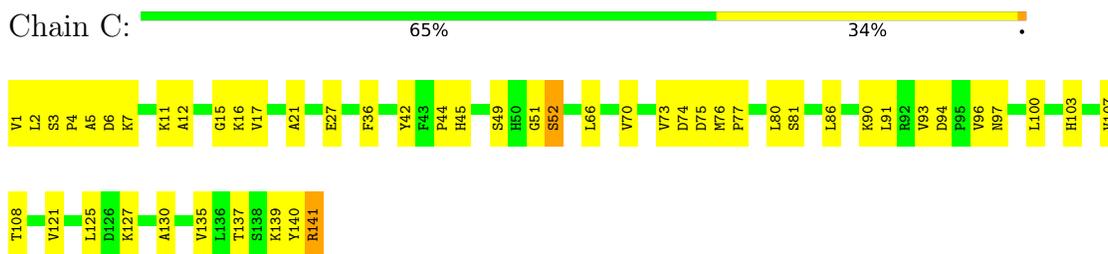| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	P	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	Q	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	R	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	S	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	U	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	V	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	W	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	X	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
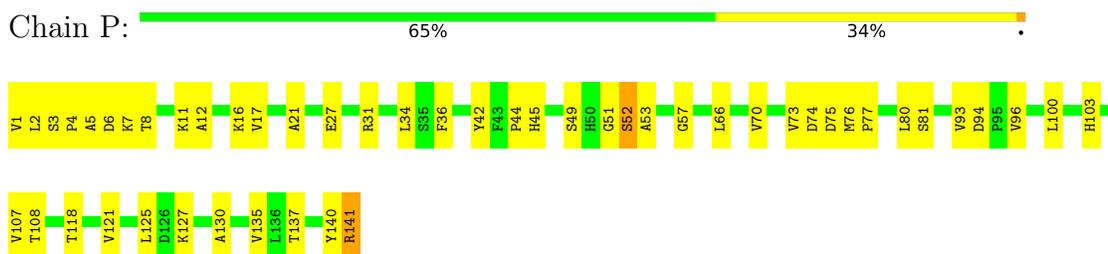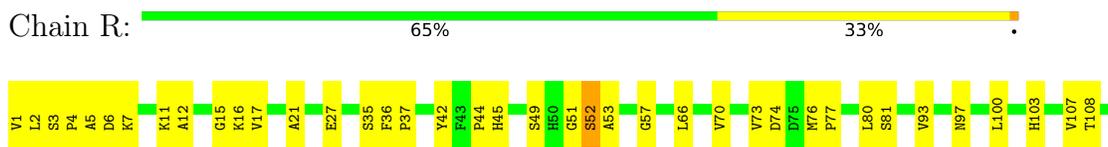
- Molecule 1: Hemoglobin alpha chain

Chain A:

- Molecule 1: Hemoglobin alpha chain
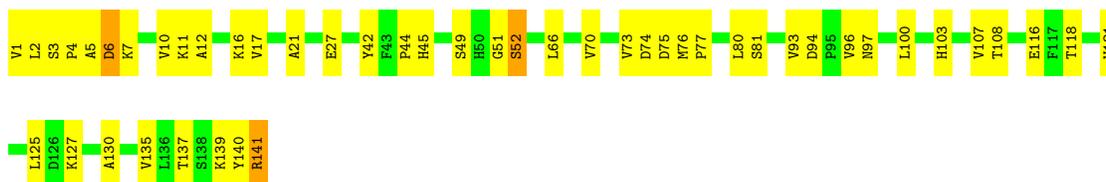
Chain C:

- Molecule 1: Hemoglobin alpha chain
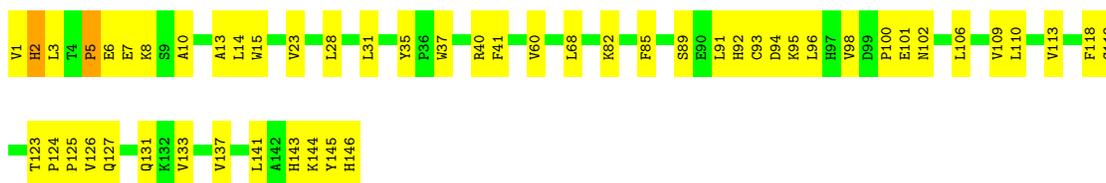
Chain P:

- Molecule 1: Hemoglobin alpha chain

Chain R:

E116 F117 T118 V121 L125 D126 K127 A130 V135 L136 T137 Y140 R141

- Molecule 1: Hemoglobin alpha chain

Chain U: 66% 32% •

V1 L2 S3 P4 A5 D6 K7 V10 K11 A12 K16 V17 A21 E27 Y42 F43 P44 H45 S49 H50 G51 S52 L66 V70 V73 D74 D75 M76 P77 L80 S81 V93 D94 P95 V96 N97 L100 H103 V107 T108 E116 F117 T118 V121

L125 D126 K127 A130 V135 L136 T137 S138 K139 Y140 R141

- Molecule 1: Hemoglobin alpha chain

Chain W: 61% 38% •

V1 L2 S3 P4 A5 D6 K7 T8 K11 A12 G15 K16 V17 A21 E27 S35 F36 P37 T41 Y42 F43 P44 H45 S49 H50 G51 S52 L66 V70 V73 D74 D75 M76 P77 N78 A79 L80 S81 L86 L91 R92 V93 D94 P95 V96 N97 L100

H103 V107 T108 T118 V121 L125 D126 K127 A130 V135 L136 T137 S138 K139 Y140 R141

- Molecule 2: Hemoglobin beta chain

Chain B: 66% 32% •

V1 H2 L3 T4 P5 E6 E7 A10 A13 L14 W15 V18 V23 L28 L31 Y35 P36 W37 R40 F41 V60 L68 N80 L81 K82 L91 H92 C93 D94 K95 L96 H97 V98 N102 L106 V109 L110 V113 H116 H117 F118 G119

T123 P124 P125 V126 Q127 Q131 K132 V133 V137 H143 K144 Y145 H146

- Molecule 2: Hemoglobin beta chain

Chain D: 64% 34% •

V1 H2 L3 T4 P5 E6 E7 K8 S9 A10 A13 L14 W15 V23 L28 L31 Y35 P36 W37 R40 F41 V60 L68 K82 F85 S89 E90 L91 H92 C93 D94 K95 L96 H97 V98 D99 P100 E101 N102 L106 V109 L110 V113 F118 G119

T123 P124 P125 V126 Q127 Q131 K132 V133 V137 L141 A142 H143 K144 Y145 H146

- Molecule 2: Hemoglobin beta chain

Chain Q: 63% 36% •

V1 H2 L3 T4 P5 E6 E7 K8 S9 A10 A13 L14 W15 V23 L28 L31 Y35 P36 W37 R40 F41 P51 M55 V60 L68 F85 S89 E90 L91 H92 C93 D94 K95 L96 H97 V98 D99 P100 E101 N102 F103 R104 L105 L106 V109 L110

V113 F118 G119 T123 P124 P125 V126 Q127 Q131 K132 V133 V137 L141 A142 H143 K144 Y145 H146

• Molecule 2: Hemoglobin beta chain

Chain S:

66%   32%   ·

V1 H2 L3 T4 P5 E6 E7 K8 S9 A10 A13 L14 W15 V23 L28 L31 Y35 R40 F41 V60 L68 K82 L91 H92 C93 D94 K95 L96 H97 V98 D99 P100 E101 R104 L105 L106 V109 L110 V113 F118 G119 T123 P124 P125 V126

Q127 Q131 K132 V133 V137 A138 N139 H143 K144 Y145 H146

• Molecule 2: Hemoglobin beta chain

Chain V:

68%   30%   ·

V1 H2 L3 T4 P5 E6 E7 K8 L14 W15 V23 L28 L31 Y35 P36 W37 R40 F41 V60 L68 K82 S89 E90 L91 H92 C93 D94 K95 L96 H97 V98 N102 F103 R104 L105 L106 V109 L110 V113 F118 G119 T123 P124 P125 V126

Q127 Q131 K132 V133 V137 H143 K144 Y145 H146

• Molecule 2: Hemoglobin beta chain

Chain X:

66%   32%   ··

V1 H2 L3 T4 P5 E6 E7 K8 S9 A10 A13 L14 W15 V23 L28 L31 Y35 P36 W37 R40 F41 V60 L68 H77 K82 F85 L91 H92 C93 D94 K95 V98 N102 F103 R104 L105 L106 V109 L110 V113 F118 G119

T123 P124 P125 V126 Q127 Q131 K132 V133 V137 L141 A142 H143 K144 Y145 H146

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	231.50Å 57.90Å 143.40Å 90.00° 101.20° 90.00°	Depositor
Resolution (Å)	10.00 – 3.20 10.01 – 3.18	Depositor EDS
% Data completeness (in resolution range)	69.7 (10.00-3.20) 86.5 (10.01-3.18)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	1.35 (at 3.16Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.204 , 0.245 0.254 , 0.280	Depositor DCC
R_{free} test set	1286 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å^2)	74.8	Xtriage
Anisotropy	0.461	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.25 , 86.0	EDS
L-test for twinning[2]	$<|L|> = 0.46, <L^2> = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	13668	wwPDB-VP
Average B, all atoms (Å^2)	85.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.62% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $<|L|>$, $<L^2>$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: HEM

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$>5	RMSZ	#$|Z|$>5
1	A	0.46	0/1097	0.63	0/1491
1	C	0.53	0/1097	0.65	0/1491
1	P	0.44	0/1097	0.63	0/1491
1	R	0.47	0/1097	0.63	0/1491
1	U	0.38	0/1097	0.61	0/1491
1	W	0.40	0/1097	0.61	0/1491
2	B	0.49	0/1153	0.62	0/1566
2	D	0.46	0/1153	0.60	0/1566
2	Q	0.51	0/1153	0.62	0/1566
2	S	0.43	0/1153	0.60	0/1566
2	V	0.40	0/1153	0.59	0/1566
2	X	0.40	0/1153	0.58	0/1566
All	All	0.45	0/13500	0.61	0/18342

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1069	0	1073	33	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1069	0	1073	35	0
1	P	1069	0	1073	36	0
1	R	1069	0	1073	35	0
1	U	1069	0	1073	36	0
1	W	1069	0	1073	43	1
2	B	1123	0	1118	34	0
2	D	1123	0	1118	37	0
2	Q	1123	0	1118	39	0
2	S	1123	0	1118	35	0
2	V	1123	0	1118	37	0
2	X	1123	0	1118	36	1
3	A	43	0	30	0	0
3	B	43	0	30	2	0
3	C	43	0	30	0	0
3	D	43	0	30	2	0
3	P	43	0	30	0	0
3	Q	43	0	30	1	0
3	R	43	0	30	0	0
3	S	43	0	30	1	0
3	U	43	0	30	0	0
3	V	43	0	30	1	0
3	W	43	0	30	0	0
3	X	43	0	30	1	0
All	All	13668	0	13506	410	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 15.

The worst 5 of 410 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:V:104:ARG:NH2	2:X:104:ARG:HH22	1.48	1.10
2:V:104:ARG:HH22	2:X:104:ARG:NH2	1.50	1.08
2:D:91:LEU:O	2:D:95:LYS:HB2	1.74	0.88
2:X:91:LEU:O	2:X:95:LYS:HB2	1.73	0.88
2:Q:91:LEU:O	2:Q:95:LYS:HB2	1.74	0.86

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:W:78:ASN:ND2	2:X:77:HIS:NE2[1_565]	2.15	0.05

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	139/141 (99%)	120 (86%)	15 (11%)	4 (3%)	4	28
1	C	139/141 (99%)	120 (86%)	15 (11%)	4 (3%)	4	28
1	P	139/141 (99%)	118 (85%)	17 (12%)	4 (3%)	4	28
1	R	139/141 (99%)	118 (85%)	17 (12%)	4 (3%)	4	28
1	U	139/141 (99%)	120 (86%)	15 (11%)	4 (3%)	4	28
1	W	139/141 (99%)	119 (86%)	16 (12%)	4 (3%)	4	28
2	B	144/146 (99%)	124 (86%)	15 (10%)	5 (4%)	3	24
2	D	144/146 (99%)	124 (86%)	15 (10%)	5 (4%)	3	24
2	Q	144/146 (99%)	125 (87%)	15 (10%)	4 (3%)	5	29
2	S	144/146 (99%)	125 (87%)	14 (10%)	5 (4%)	3	24
2	V	144/146 (99%)	126 (88%)	13 (9%)	5 (4%)	3	24
2	X	144/146 (99%)	125 (87%)	14 (10%)	5 (4%)	3	24
All	All	1698/1722 (99%)	1464 (86%)	181 (11%)	53 (3%)	4	26

5 of 53 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	2	HIS
2	D	2	HIS
2	Q	2	HIS
2	S	2	HIS
2	V	2	HIS

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	113/113 (100%)	112 (99%)	1 (1%)	78	91
1	C	113/113 (100%)	112 (99%)	1 (1%)	78	91
1	P	113/113 (100%)	112 (99%)	1 (1%)	78	91
1	R	113/113 (100%)	112 (99%)	1 (1%)	78	91
1	U	113/113 (100%)	112 (99%)	1 (1%)	78	91
1	W	113/113 (100%)	112 (99%)	1 (1%)	78	91
2	B	118/118 (100%)	115 (98%)	3 (2%)	47	77
2	D	118/118 (100%)	115 (98%)	3 (2%)	47	77
2	Q	118/118 (100%)	115 (98%)	3 (2%)	47	77
2	S	118/118 (100%)	115 (98%)	3 (2%)	47	77
2	V	118/118 (100%)	115 (98%)	3 (2%)	47	77
2	X	118/118 (100%)	115 (98%)	3 (2%)	47	77
All	All	1386/1386 (100%)	1362 (98%)	24 (2%)	60	83

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	S	40	ARG
2	V	5	PRO
1	U	141	ARG
2	V	40	ARG
2	D	40	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 54 such sidechains are listed below:

Mol	Chain	Res	Type
1	R	89	HIS
2	S	131	GLN
1	W	103	HIS
1	R	97	ASN

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Mol	Chain	Res	Type
2	S	2	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

12 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
3	HEM	U	142	1	41,50,50	1.41	4 (9%)	45,82,82	1.16	1 (2%)
3	HEM	V	147	2	41,50,50	1.40	4 (9%)	45,82,82	1.04	1 (2%)
3	HEM	B	147	2	41,50,50	1.50	6 (14%)	45,82,82	1.00	4 (8%)
3	HEM	A	142	1	41,50,50	1.49	5 (12%)	45,82,82	1.44	5 (11%)
3	HEM	S	147	2	41,50,50	1.45	5 (12%)	45,82,82	1.17	3 (6%)
3	HEM	W	142	1	41,50,50	1.40	3 (7%)	45,82,82	1.31	4 (8%)
3	HEM	Q	147	2	41,50,50	1.55	6 (14%)	45,82,82	1.46	7 (15%)
3	HEM	R	142	1	41,50,50	1.44	5 (12%)	45,82,82	1.29	3 (6%)
3	HEM	C	142	1	41,50,50	1.47	9 (21%)	45,82,82	1.42	5 (11%)
3	HEM	D	147	2	41,50,50	1.49	6 (14%)	45,82,82	1.35	6 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
3	HEM	X	147	2	41,50,50	1.48	6 (14%)	45,82,82	1.02	2 (4%)
3	HEM	P	142	1	41,50,50	1.42	3 (7%)	45,82,82	1.27	4 (8%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	HEM	U	142	1	-	6/12/54/54	-
3	HEM	V	147	2	-	4/12/54/54	-
3	HEM	B	147	2	-	4/12/54/54	-
3	HEM	A	142	1	-	6/12/54/54	-
3	HEM	S	147	2	-	4/12/54/54	-
3	HEM	W	142	1	-	6/12/54/54	-
3	HEM	Q	147	2	-	4/12/54/54	-
3	HEM	R	142	1	-	6/12/54/54	-
3	HEM	C	142	1	-	6/12/54/54	-
3	HEM	D	147	2	-	4/12/54/54	-
3	HEM	X	147	2	-	4/12/54/54	-
3	HEM	P	142	1	-	6/12/54/54	-

The worst 5 of 62 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	147	HEM	C3C-CAC	-4.56	1.38	1.47
3	Q	147	HEM	C3C-CAC	-4.38	1.38	1.47
3	W	142	HEM	C3C-CAC	-4.36	1.38	1.47
3	B	147	HEM	C4A-NA	4.35	1.45	1.36
3	X	147	HEM	C3C-CAC	-4.15	1.39	1.47

The worst 5 of 45 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(º)	Ideal(º)
3	A	142	HEM	CBA-CAA-C2A	5.21	121.51	112.62
3	C	142	HEM	CBA-CAA-C2A	4.95	121.06	112.62
3	P	142	HEM	CBA-CAA-C2A	4.65	120.55	112.62
3	U	142	HEM	CBA-CAA-C2A	4.30	119.95	112.62
3	W	142	HEM	CBA-CAA-C2A	4.27	119.90	112.62

There are no chirality outliers.

5 of 60 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	R	142	HEM	C2B-C3B-CAB-CBB
3	A	142	HEM	C4B-C3B-CAB-CBB
3	C	142	HEM	C4B-C3B-CAB-CBB
3	P	142	HEM	C4B-C3B-CAB-CBB
3	R	142	HEM	C4B-C3B-CAB-CBB

There are no ring outliers.

6 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	V	147	HEM	1	0
3	B	147	HEM	2	0
3	S	147	HEM	1	0
3	Q	147	HEM	1	0
3	D	147	HEM	2	0
3	X	147	HEM	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand HEM U 142

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM V 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM B 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 142

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM S 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM W 142

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM Q 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM R 142

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM C 142

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM D 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM X 147

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM P 142

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
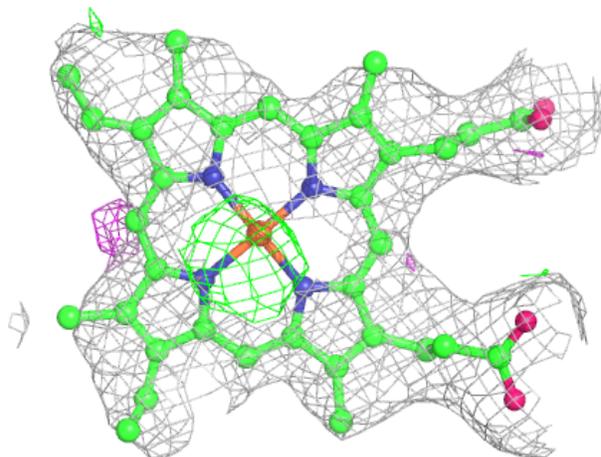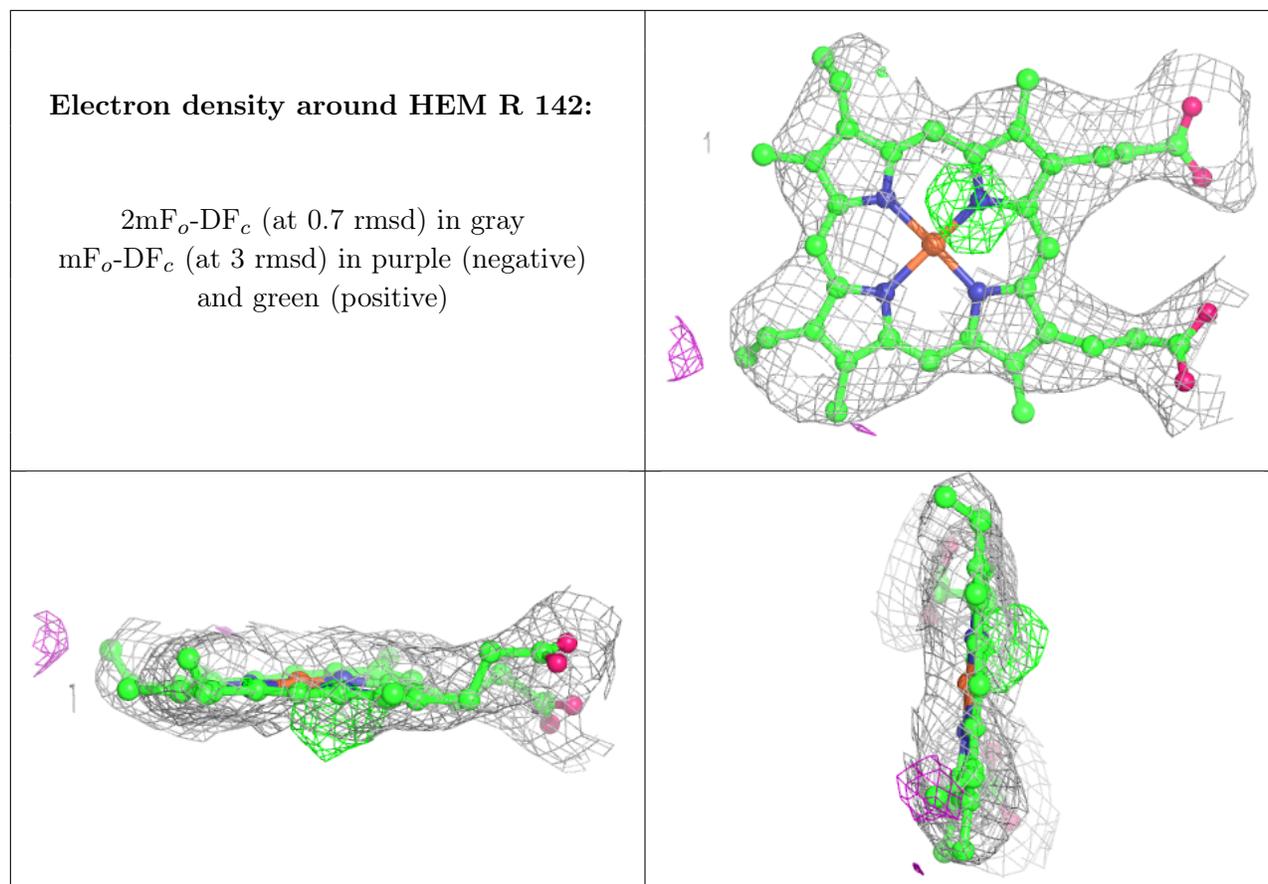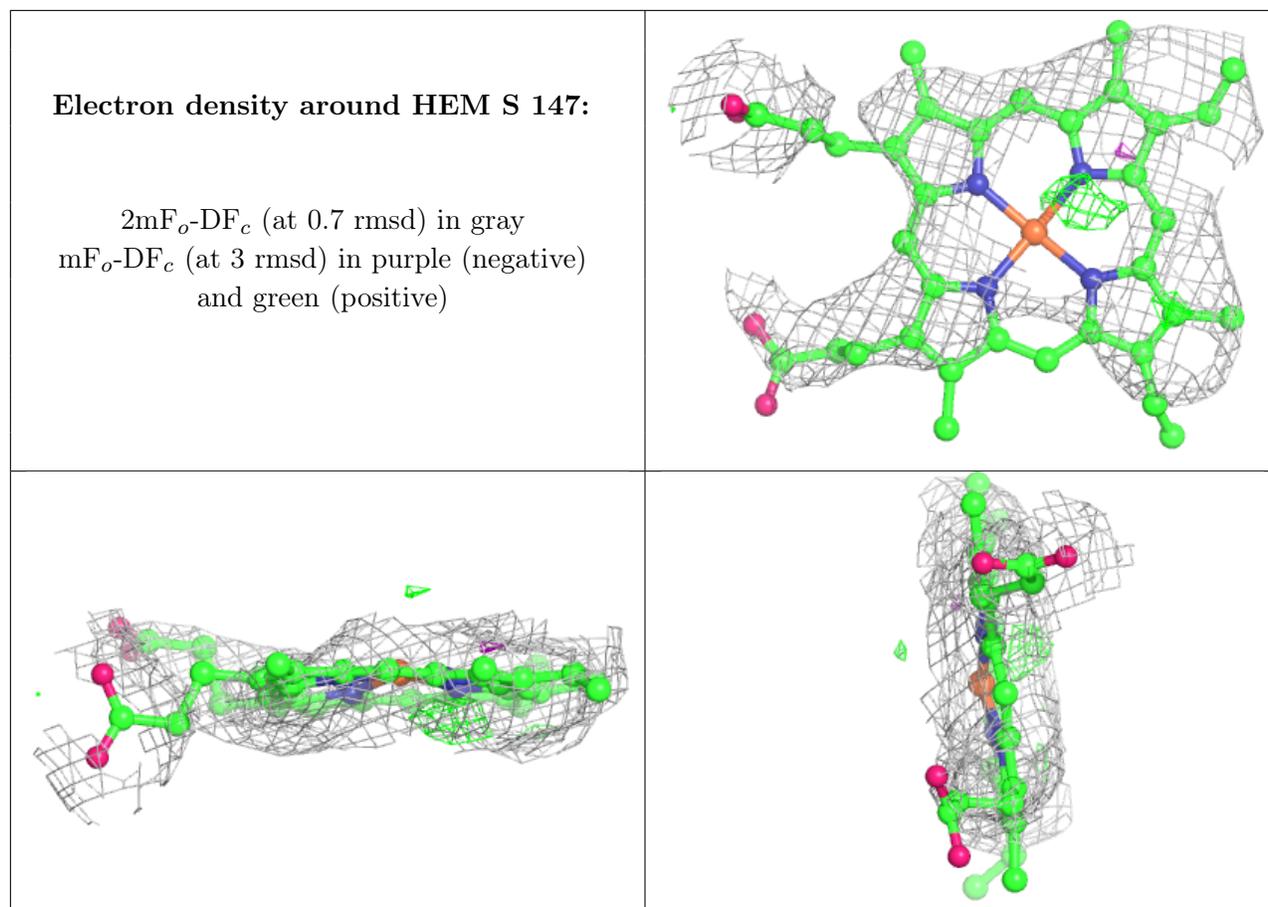
Electron density around HEM A 142:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
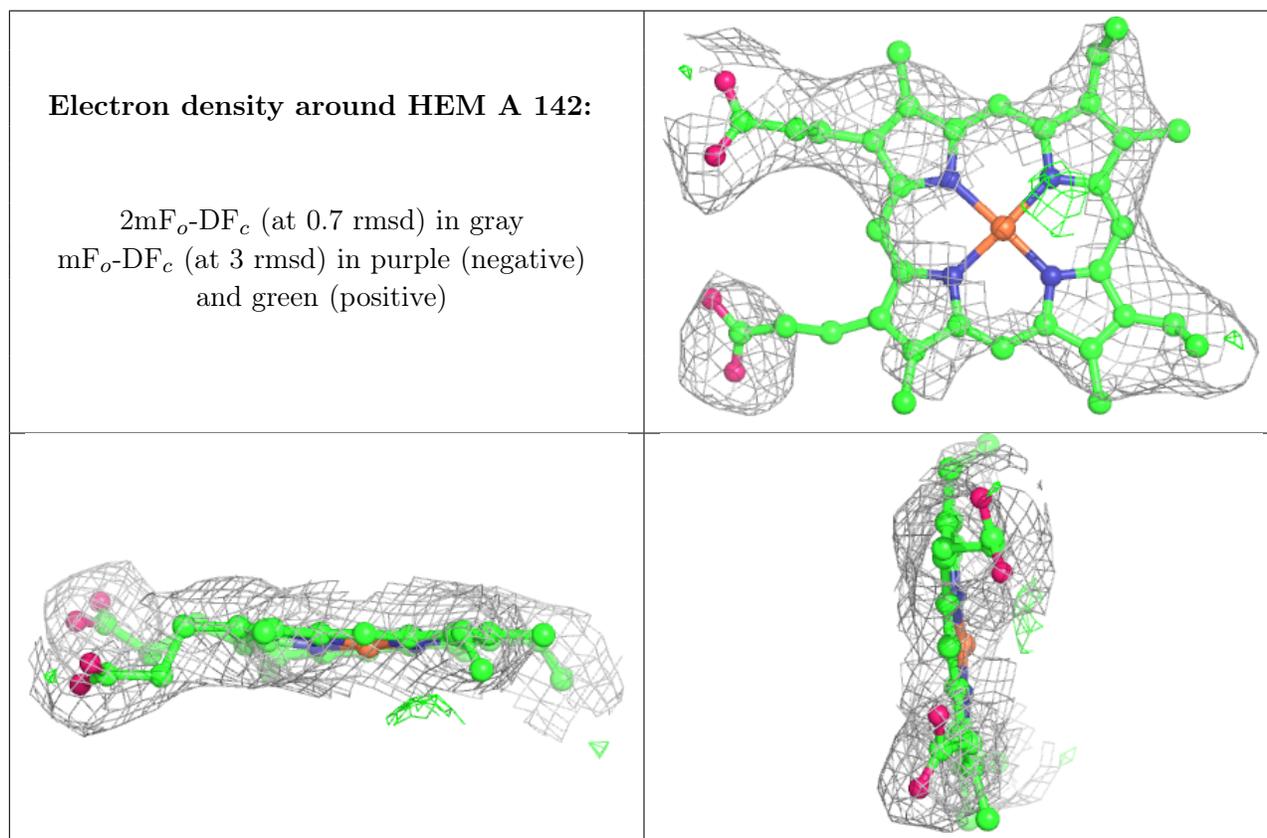
Electron density around HEM B 147:

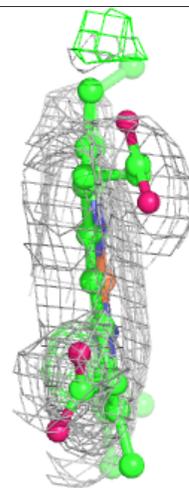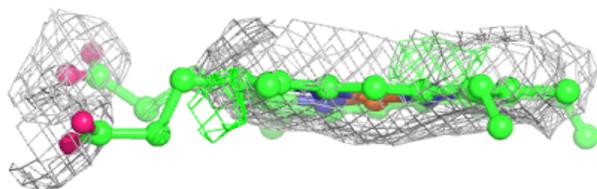2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEM C 142:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEM D 147:

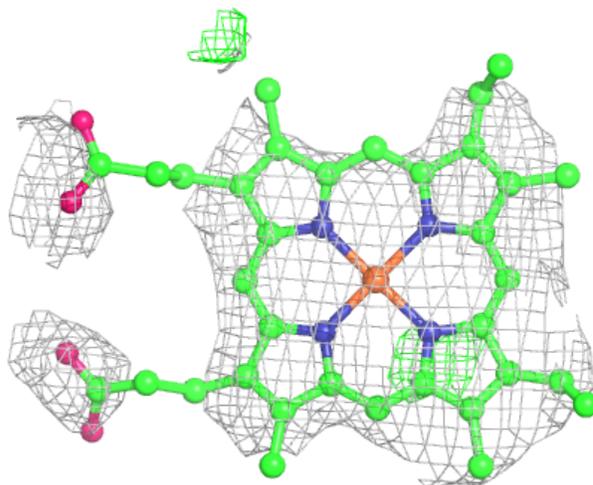$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
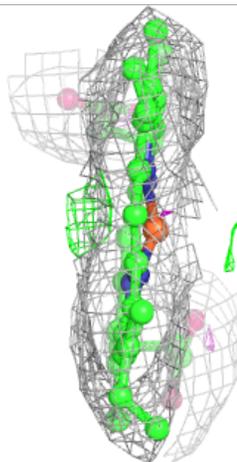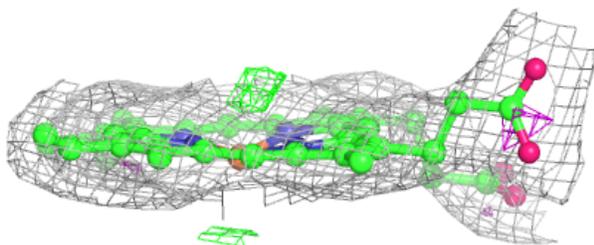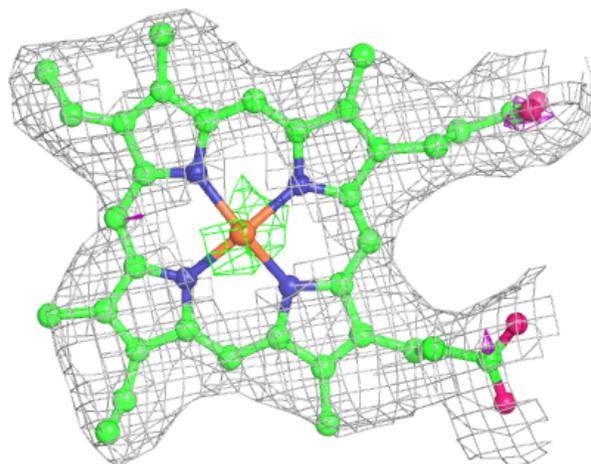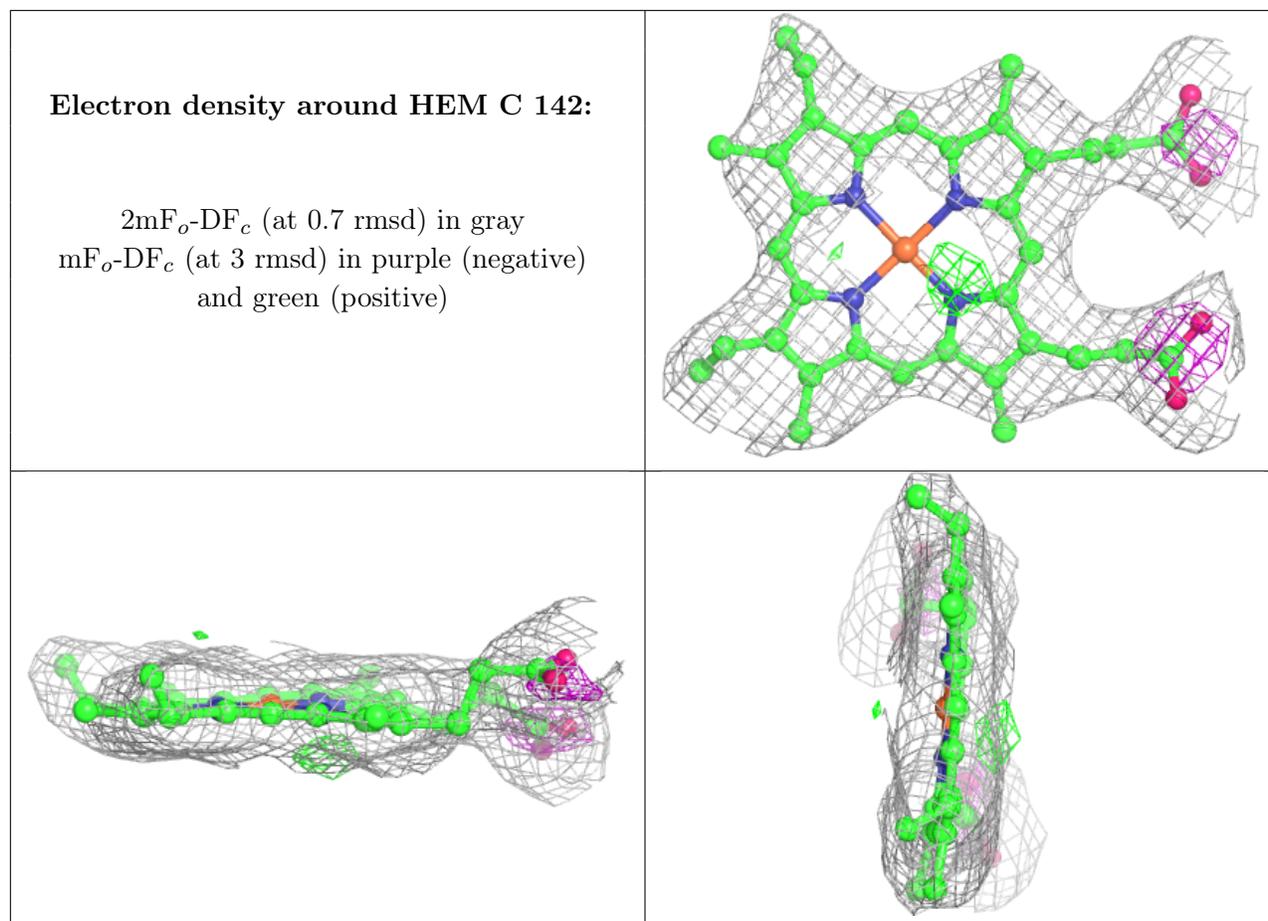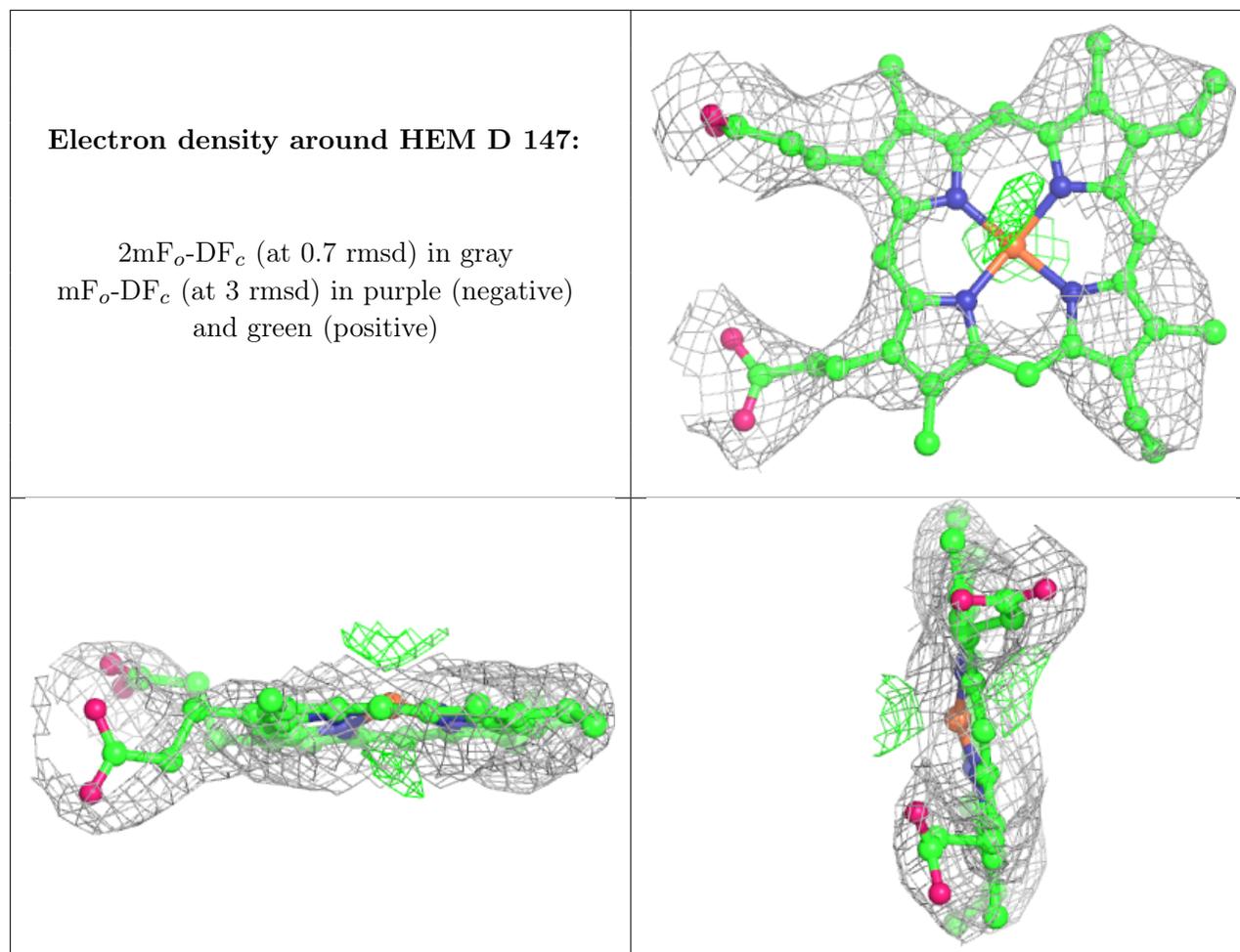
Electron density around HEM P 142:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
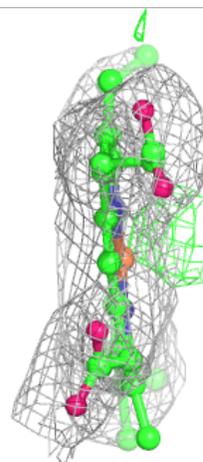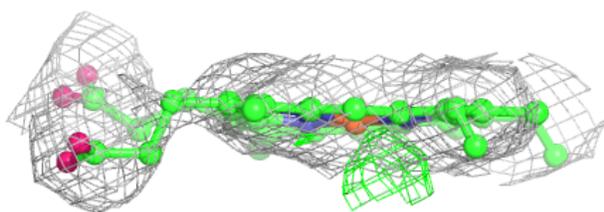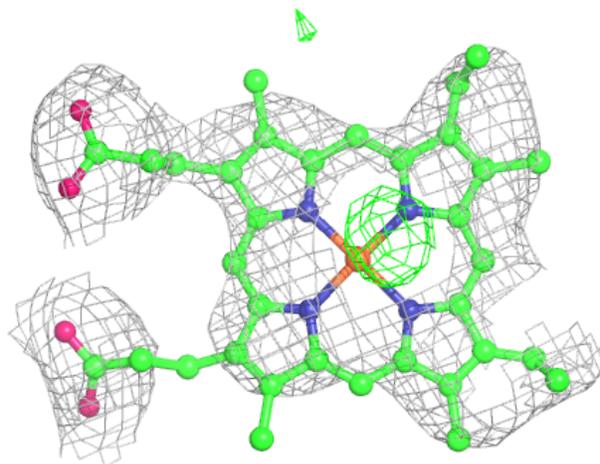
Electron density around HEM Q 147:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
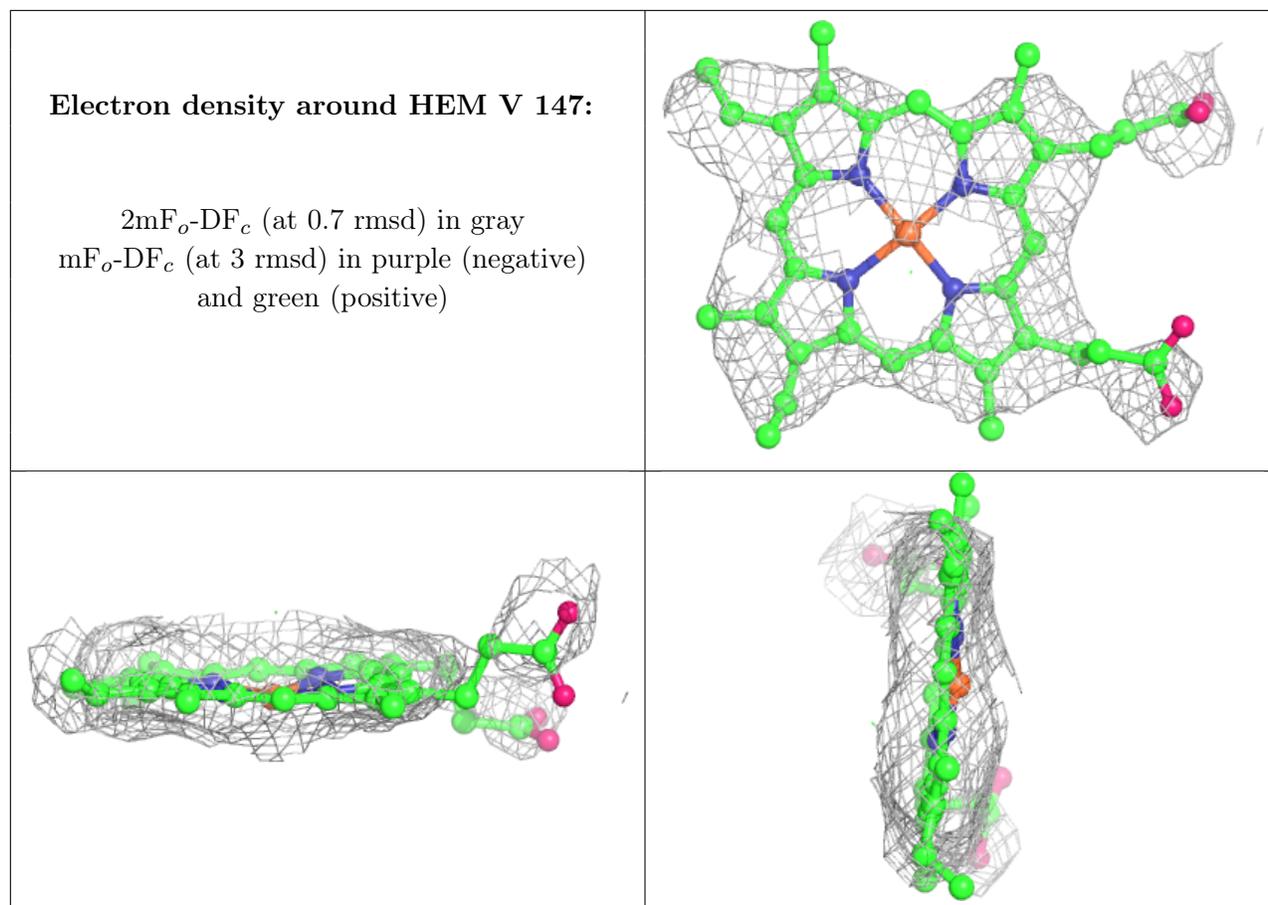mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEM R 142:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around HEM S 147:**

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
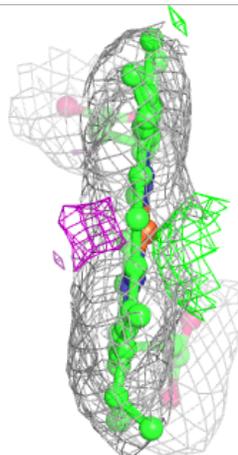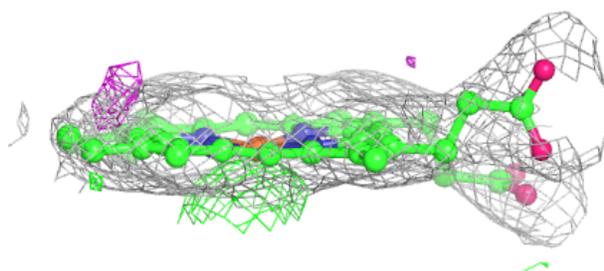
Electron density around HEM U 142:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
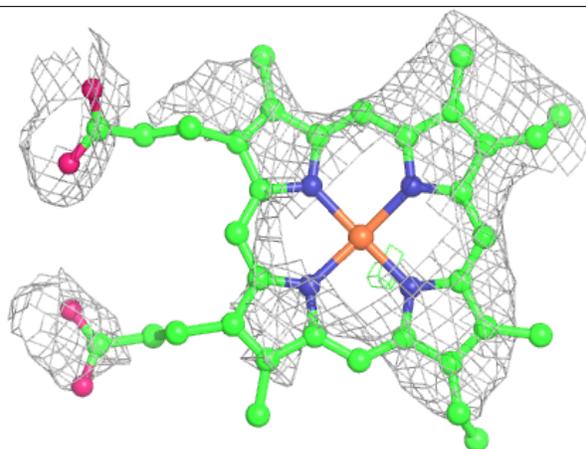and green (positive)

Electron density around HEM V 147:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEM W 142:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
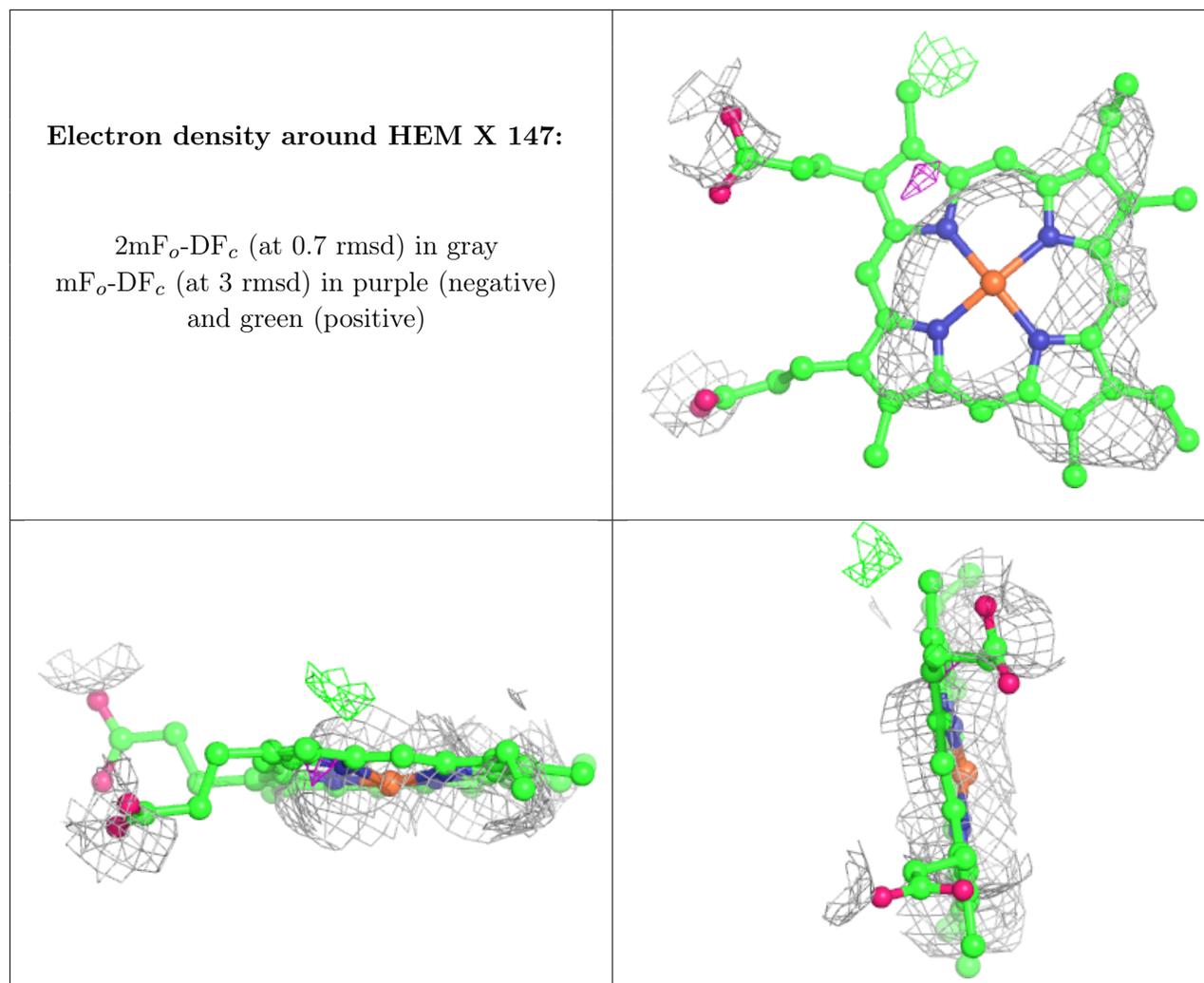and green (positive)

Electron density around HEM X 147:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
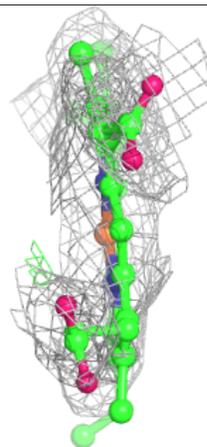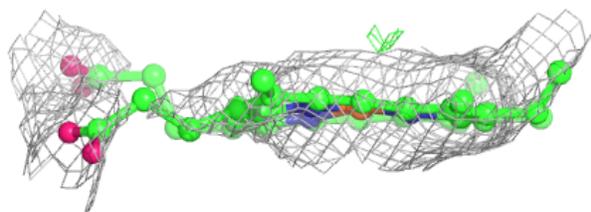
6.5 Other polymers (i)

Unable to reproduce the depositors R factor - this section is therefore empty.